



Characterization of Macroinvertebrate Community and Drift in a Tributary of Buffalo National River, Prior to Damming

PMIS Number: 82725

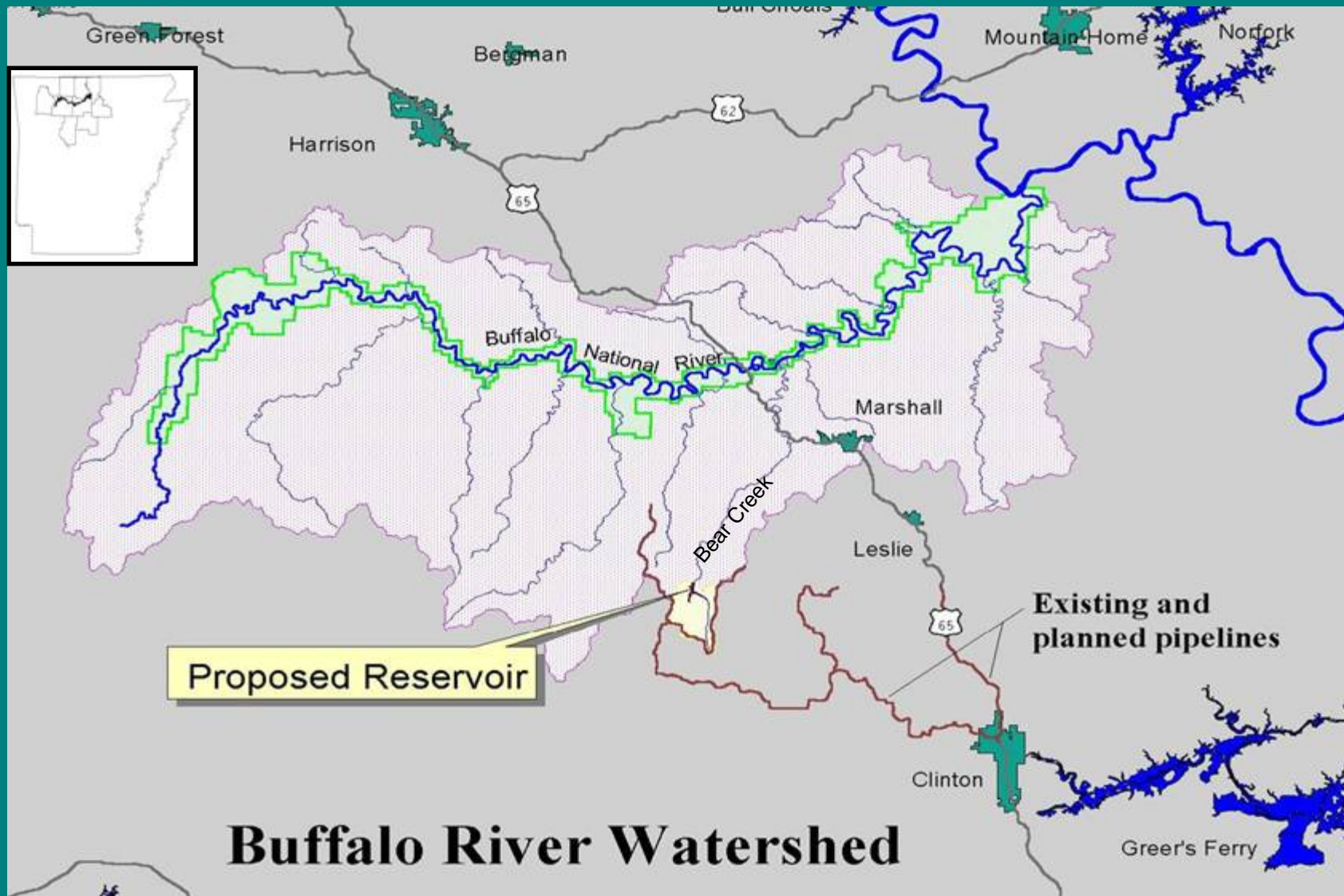


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BEAR CREEK PROPOSED IMPOUNDMENT





MACROINVERTEBRATE STUDY OBJECTIVES

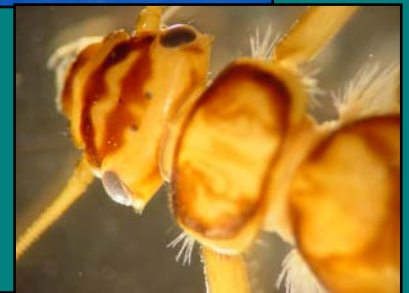
Establish baseline conditions by:

- ✓ Benthic sampling – stream bottom
- ✓ Drift net sampling - drifting in water column
- ✓ 3 most common geomorphic habitats (upper, mid, and lower reaches)
- ✓ Spring 2003 (April & May)



Trichoptera Hydropsychidae sp.
VCSU Macro-Invertebrate Lab

Plecoptera Perlidae *Acroneuria* sp.
Buffalo National River



Ephemeroptera Baetidae *Baetis* sp.
VCSU Macro-Invertebrate Lab



BEAR CREEK



Map by D. Mcfee



SAMPLING SITES

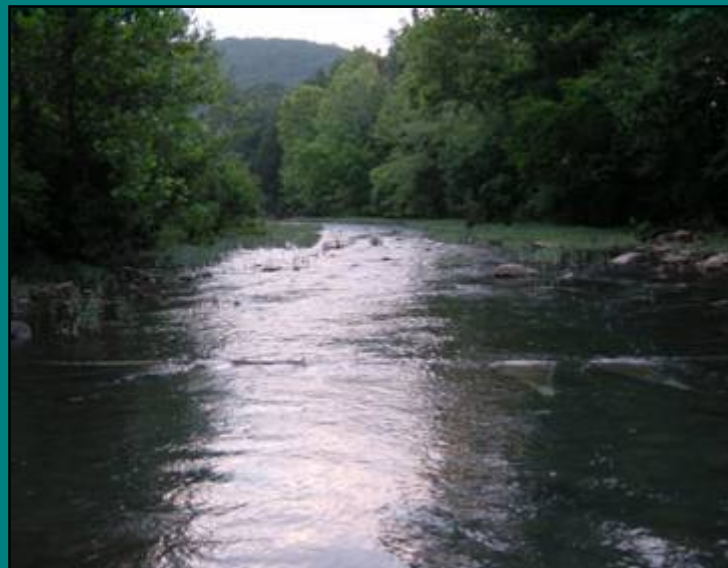
| SITE | GEOLOGY | GEOMORPHOLOGY | LAND USE |
|--------|--|---|--------------------------------|
| UPPER | Boston Mountains Sandstone & shale Pennsylvanian | Relatively steep bed slope Boulders with smaller components of bedrock and cobble dominant sediments | Forest |
| MIDDLE | Springfield Plateau Limestone Mississippian | Low bed slope Sediments dominated by cobble w/ less frequency of gravel & bedrock | Agricultural |
| LOWER | Salem Plateau Limestone Silurian/Ordovician | Low bed slope Sediments dominated by cobble w/ fine gravel | 70% Forest 30% Agricultural |



SAMPLING SITES



UPPER



MIDDLE



LOWER



SAMPLE COLLECTION, PROCESSING AND IDENTIFICATION

| METHOD | # COLLECTED | # PROCESSED | # ORGANISMS IDENTIFIED |
|------------------|------------------------|------------------------|-----------------------------------|
| Benthic | 75 | 75 | 20,684 |
| Drift | 238 | 139 | 30,589 |
| Block Net | 15 | 15 | 3,154 |
| TOTAL | 328 | 229 | 54,427 |

Number of taxa identified (Genus level): 140



BENTHIC SAMPLING



- “Modified” Slack sampler
- 3 samples per habitat
- Most prevalent habitats (riffle, glide/pool, and run)
- Physical and physiochemical measurements



DRIFT SAMPLING



- 12-hour nighttime drift sample
- Velocity (m/s) of water passing through each net
- Physiochemical measurements



BLOCK NET DRIFT SAMPLING



- Estimate drift sampling efficiencies
- Captured total density of macros drifting vs. density of those collected by drift nets



SAMPLE PROCESSING



- Quantitative approach
- Equal subsampling areas
- Methodically removed as seen with the naked eye
- Maximum 2 hour processing time



MACRO IDENTIFICATION

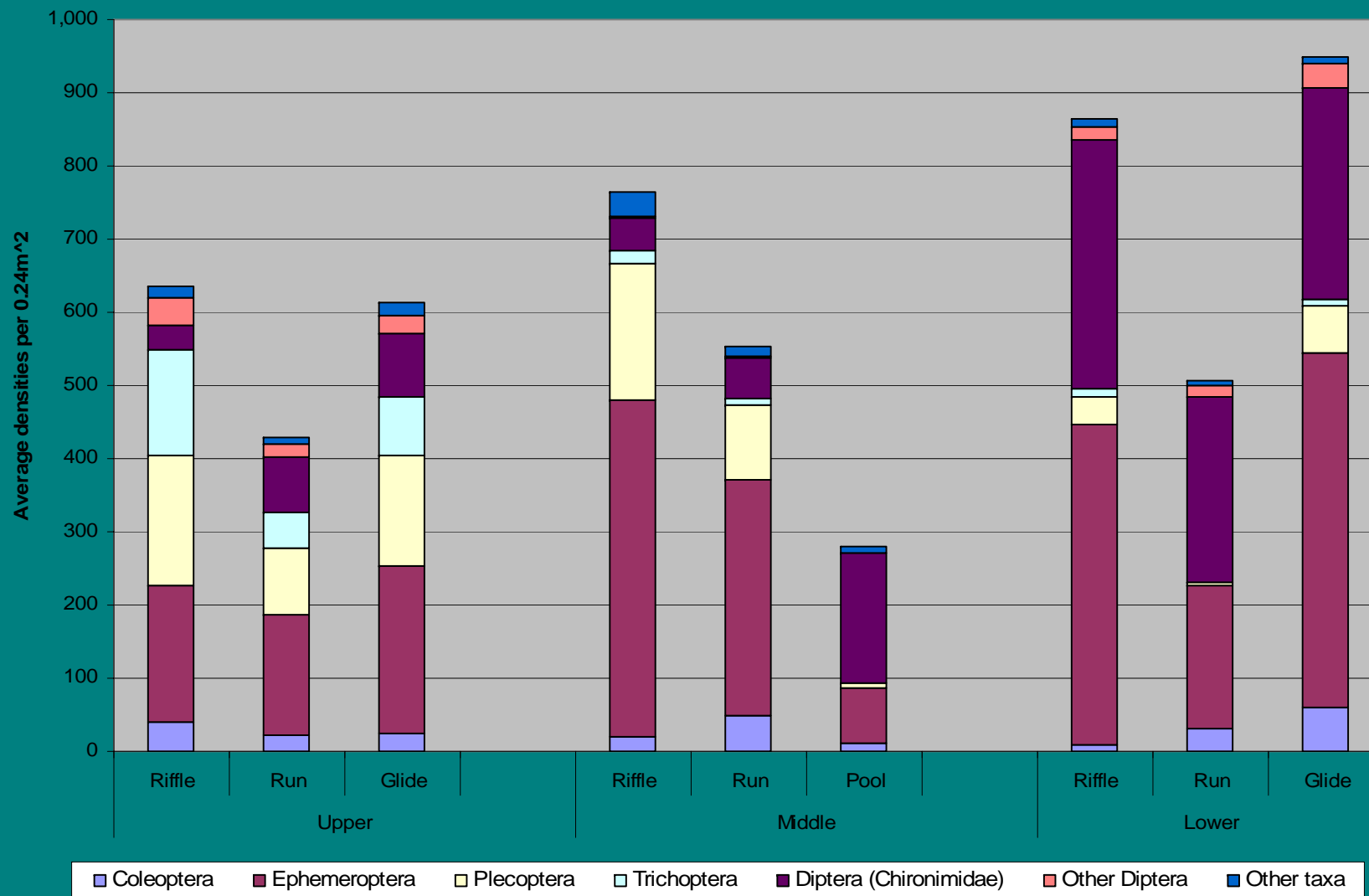


- Determined to lowest level practical (usually to genus)
- Merritt and Cummins (1996)
- Other national, state and regional keys (Poulton and Stewart 1991, Moulton and Stewart 1996, and Pennak 1989)
- Voucher specimens preserved for future verification and curation



BENTHIC DENSITIES

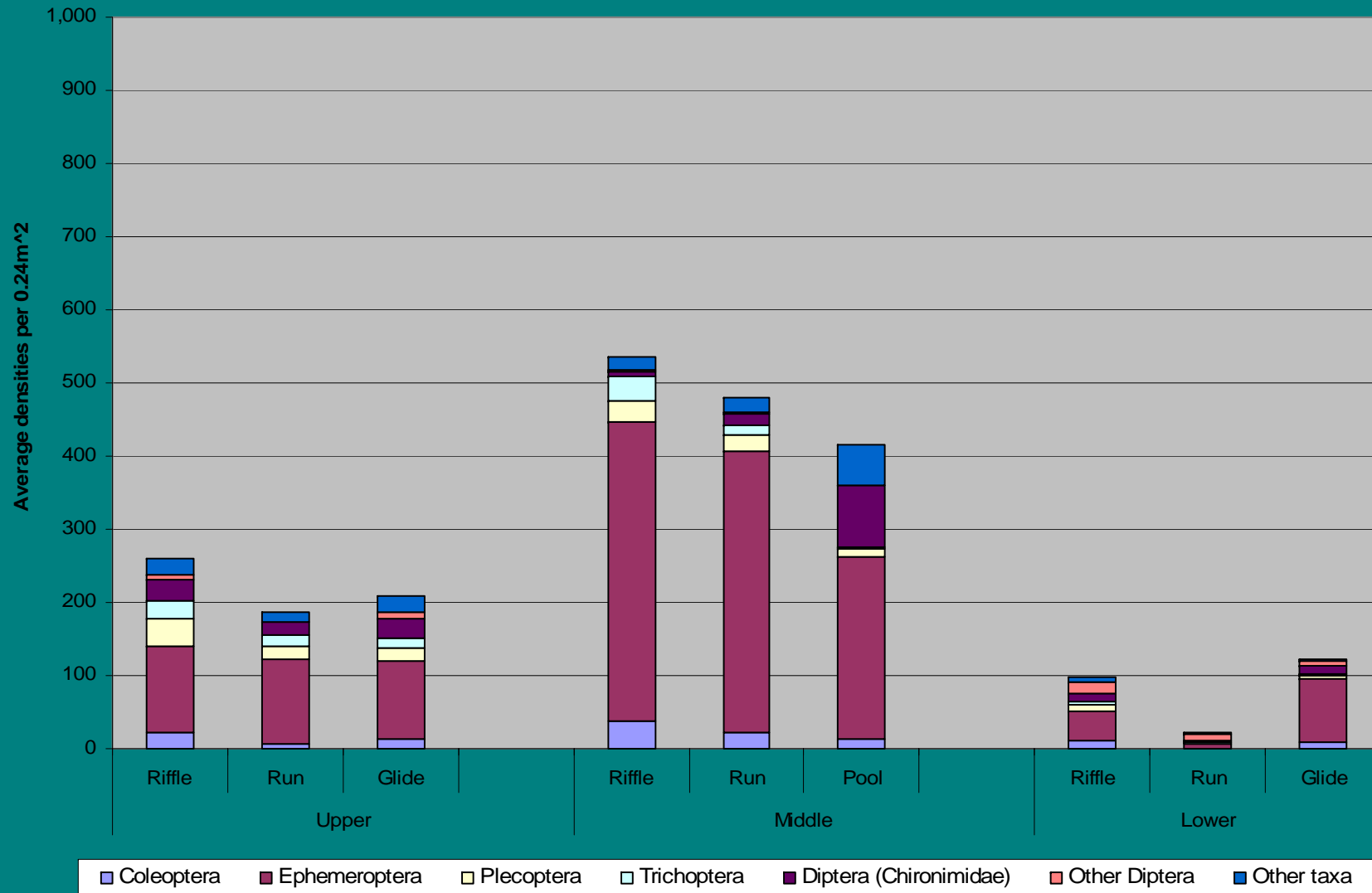
April 2003





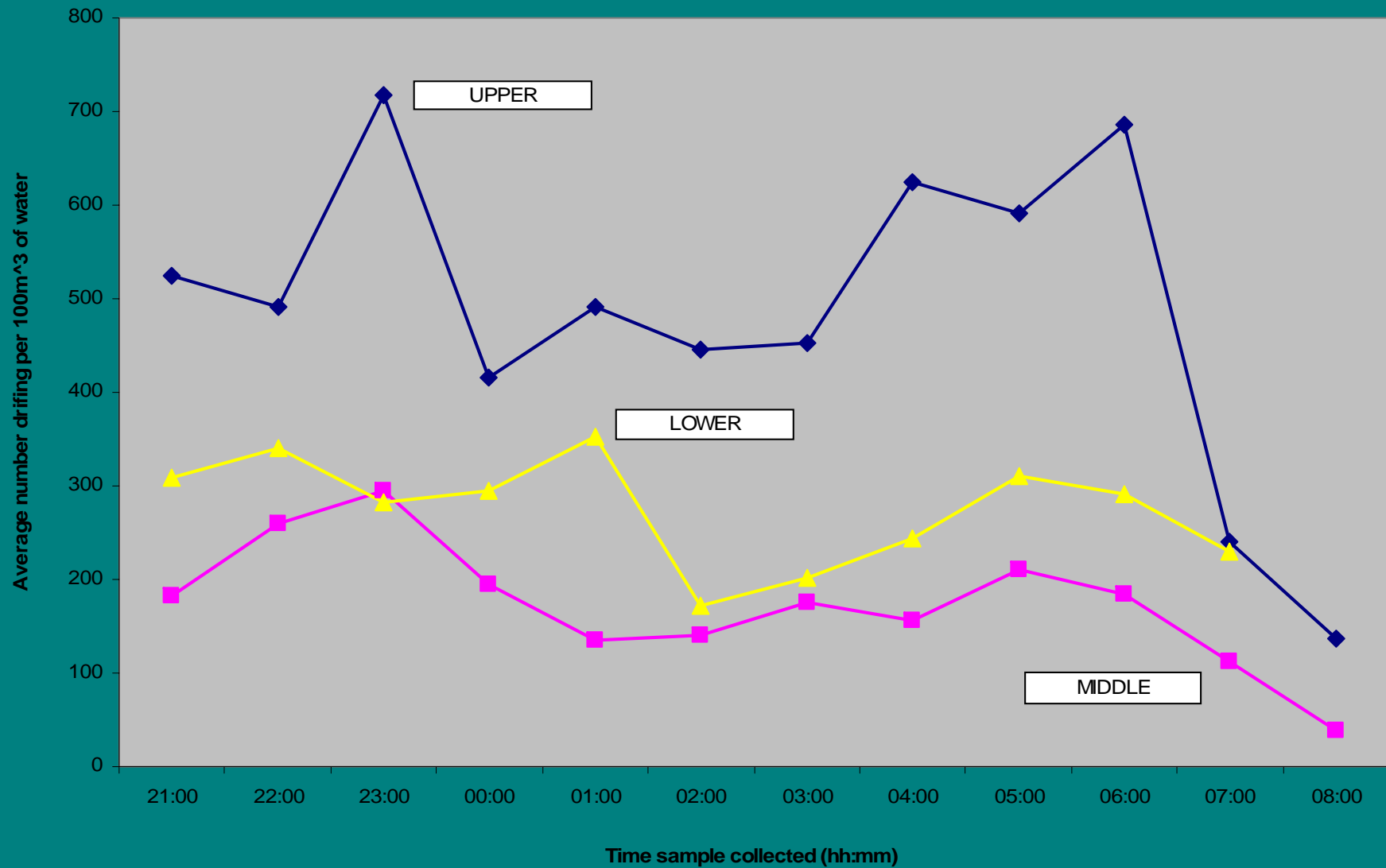
BENTHIC DENSITIES

May 2003



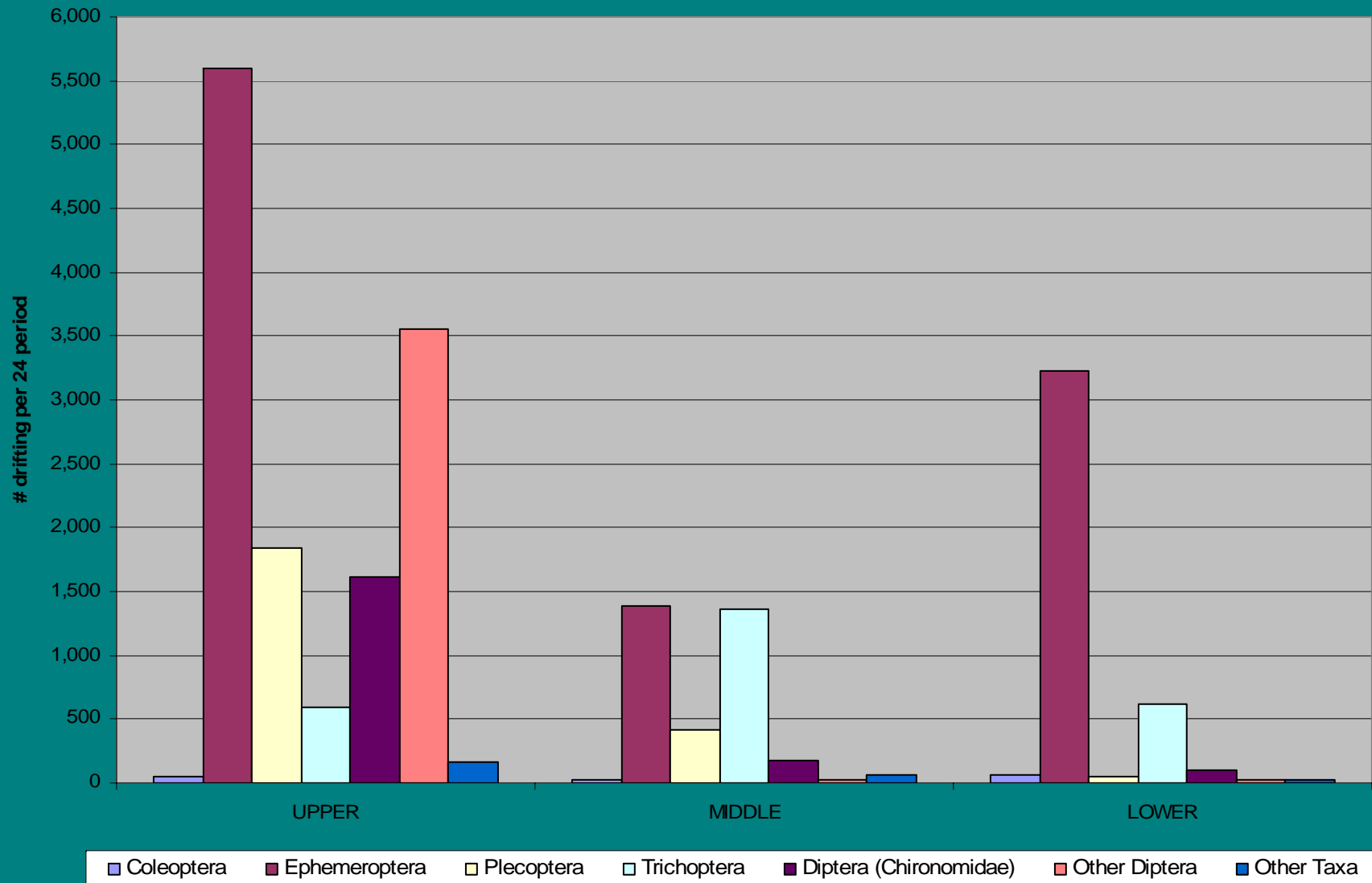


DRIFT DENSITIES – April 2003





DRIFT RATES – April 2003





BLOCK NET DRIFT SAMPLING

Percent collected – May 2003

| UPPER | | | | MIDDLE | | | | LOWER | | | |
|-------------|------------|-------|-----|-------------|------------|-------|-----|-------------|------------|-------|-----|
| Nets Tot | Blk Tot | Total | % | Nets Tot | Blk Tot | Total | % | Nets Tot | Blk Tot | Total | % |
| 619 | 44 | 663 | 94% | 718 | 51 | 769 | 94% | 1,892 | 185 | 2,077 | 92% |

| OVERALL | | | |
|-------------|------------|-------|-----|
| Nets Tot | Blk Tot | Total | % |
| 3,229 | 280 | 3,509 | 93% |



SUMMARY

- **Proposed dam in headwaters of Bear Creek**
- **Slack condition created by dam**
- **25% flow contribution by Bear Creek**
- **Mid-reaches experiencing drying during late summer / early fall**
- **Dispersal of aquatic organisms vital to recolonization of disturbed areas**
- **Pristine habitat in upper reaches with abundant organisms**
- **Occurrence of drifting organisms downstream**



CONCLUSIONS

- **Construction of dam in upper reaches of Bear Creek:**
 - ✓ **Destroy pristine habitat**
 - ✓ **Affect distribution of vital nutrients & macros to loosing reaches and downstream**
 - ✓ **Alter biological communities of middle and lower reaches**
 - ✓ **Have potential compounding effects to Buffalo River aquatic communities**
- **Critical that baseline conditions of Bear Creek benthic community and drift species be documented**



CONCLUSIONS (cont'd)

- **Study objectives (baseline conditions) met through benthic and drift net sampling**
- **Findings will be documented in Final Completion Report**



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